

## **REMARKS**

### **Summary of the Office Action**

Claims 1-8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Applicant Prior Art*.

Claims 9-11 are allowed.

### **Summary of the Response to the Office Action**

A Revocation of Original Power of Attorney and Grant of New Power of Attorney, Change of Attorney Docket Number, and Change of Correspondence Address are submitted herewith. Claims 1 and 7 have been amended by this Amendment. Claims 1-11 remain currently pending.

### **Information Disclosure Statement**

Applicant notes that an initialed copy of the PTO-Form 1449 from the Information Disclosure Statement filed on April 18, 2002 was not returned. Applicant respectfully requests that the Examiner consider the documents listed in the Information Disclosure Statement filed on April 18, 2002, evidence that consideration by making an appropriate notation on the PTO-Form 1449 and provide an initialed copy of the PTO-Form 1449 with the next communication.

### **The Disposition of the Claims**

Applicant notes with appreciation the Examiner's indication that claims 9-11 are allowed as noted on Page 1 of the Office Action. While Applicant agrees that these claims are allowable and patentably distinguish over the prior art, Applicant respectfully does not acquiesce that patentability resides in each feature, exactly as expressed in the claims, nor that each and every feature is required for patentability.

In addition, claims 1-8 are also believed to be allowable in light of the documents relied upon by the Examiner for the following reasons.

**Claim Rejection Under 35 U.S.C. §103(a)**

Claims 1-8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Applicant Prior Art*. This rejection is respectfully traversed.

The Office Action appears to assert that FIG. 3 as described in the Description of the Related Art of the instant application constitutes acknowledged prior art and that it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify FIG. 3 to render the claimed invention unpatentable. Applicant respectfully submits that even if FIG. 3 as described in the Description of Related Art of the instant application constitutes actual prior art, FIG. 3 still does not render the claimed invention unpatentable. For instance, no portion of FIG. 3 teaches or suggests the claimed combination including at least “a plurality of power amplifiers for driving the plurality of ink jet head units; a plurality of flexible flat cables disposed between said plurality of power amplifiers and the plurality of ink jet head units for connecting the plurality of ink jet head units and said plurality of power amplifiers; and a drive waveform signal generating circuit for supplying a drive waveform signal to said plurality of power amplifiers and the plurality of ink jet head units,” and “wherein said plurality of power amplifiers are disposed corresponding to the plurality of ink jet head units, said plurality of power amplifiers supplying a drive waveform signal that is input from said drive waveform signal generating circuit to said plurality of power amplifiers through said plurality of flexible flat cables so as to drive the plurality of ink jet head units,” as set forth in independent claim 1.

Similarly, Applicant respectfully submits that no portion of FIG. 3 of the instant application teaches or suggests the claimed method including at least “driving a plurality of

piezoelectric elements disposed in a plurality of ink jet head units which are able to control velocity and size of ink droplets being proportional to an acceleration and intensity of deformation of the piezoelectric element, each of the plurality of ink jet head units has a plurality of power amplifiers for driving the plurality of ink jet head units, a plurality of flexible flat cables for connecting the plurality of ink jet head units and said plurality of power amplifiers, and a drive waveform signal generating circuit for supplying a drive waveform signal to the plurality of ink jet head units” and “driving the plurality of power amplifiers so as to amplify the drive waveform signal,” as set forth in independent claim 7.

According to an embodiment of the instant invention as claimed, a piezoelectric element driving circuit includes a drive waveform signal generating circuit (1) for generating a drive waveform signal, a plurality of power amplifiers (2) for amplifying the drive waveform signal, a plurality of flexible flat cables (3) for connecting the power amplifiers and respective head units (4). See FIG. 5 of the instant application.

In contrast to the claimed invention as a whole, the “piezoelectric element driving circuit shown in Fig. 3 [of the instant application] comprises a drive waveform signal generating circuit 1, a power amplifier 2, a flexible flat cable (FFC) 3, a plurality of head units 4, a plurality of switch devices 5, and a plurality of piezoelectric elements 5.” Page 4, lines 6-10 of the Specification. As acknowledged by the Final Office Action, FIG. 3 does not show a plurality of amplifiers and flexible flat cables. See page 3, lines 11-12 of the Final Office Action. However, the Final Office Action asserts that it would have been obvious to one having ordinary skill in the art at the time the invention was to made to modify FIG. 3 to use a plurality of amplifiers and

flexible flat cables, since mere duplication of essential working parts of a device involves only routine skill in the art. See page 3, lines 18-21 of the Final Office Action.

However, even if a mere duplication of essential working parts involves only routine skill in the art, the modification of FIG. 3 as purported by the Final Office Action is not a mere duplication of essential working parts. As described in the Description of Related Art, the drive waveform signal generating circuit 1 generates a drive waveform signal for driving a plurality of piezoelectric elements 6, the power amplifier 2 amplifies the drive waveform signal, and the FFC 3 connects the power amplifier 2 and the head units 4. See page 4, lines 10-13 of the Specification. Thus, one having ordinary skill in the art would have had to recognize that at least the driving waveform signal generating circuit 1, the power amplifier 2 and the FFC 3 are essential working parts of the driving circuit as illustrated in FIG. 3, particularly since the drive waveform signal generating circuit 1 generates the drive waveform signal. Further, one having ordinary skill in the art would have had to recognize that a duplication of essential working parts of the driving circuit of FIG. 3, as asserted by the Final Office Action, would involve duplicating the driving waveform signal generating circuit 1, the power amplifier 2 and the FFC 3. Accordingly, Applicant respectfully submits that the Final Office Action applies impermissible hindsight and ignores the drive waveform signal generating circuit 1 as an essential working part of the driving circuit in FIG. 3 to arrive at the purported modification of only duplicating amplifiers and flexible flat cables. Thus, it is respectfully submitted that the modification as purported by the Final Office Action is not a mere duplication of essential working parts and that it would not be obvious to one having ordinary skill in the art at the time the invention was to made to modify FIG. 3 as purported by the Final Office Action.

The Final Office Action further cites FIGS. 9A and 10 of *Puskas* (U.S. Patent No. 5,834,871) to allegedly remedy the deficiencies in FIG. 3 and to allegedly disclose the concept of using multiple generator circuits to drive each associated transducer. However, it is respectfully submitted that *Puskas* fails to provide any motivation or suggestion to modify FIG. 3 of the instant application (having one drive signal generating circuit, one power amplifier and one flexible flat cable to drive multiple head units), particularly since *Puskas* does not disclose a single generator circuit for driving multiple transducers or a duplication of only some essential parts of the single generator circuit to drive multiple transducers. In fact, in contrast to FIG. 3 of the instant application, *Puskas* is directed to an apparatus having three or four generators. See FIG. 9-11 of *Puskas*. Accordingly, it is respectfully submitted that the references cited lack motivation or suggestion to modify FIG. 3 as purported by the Final Office Action.

MPEP 2143.03 instructs that “[t]o establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).” Since, in view of the above, *Applicant Prior Art* fails to teach or suggest each and every element set forth in independent claim 1 and 7, it is respectfully submitted that *Applicant Prior Art* does not render claims 1 and 7 unpatentable. Further, since claims 2-6 and 8 depend from claims 1 and 7, it is respectfully submitted that *Applicant Prior Art* also does not render claims 2-6 and 8 unpatentable. Accordingly, withdrawal of the rejection of claim 1-8 under 35 U.S.C. §103(a) is respectfully requested.

### **Conclusion**

In view of the foregoing, withdrawal of the rejections and allowance of the pending claims are earnestly solicited. Should there remain any questions or comments regarding this

response or the application in general, the Examiner is urged to contact the undersigned at the number listed below.

Attached hereto is marked-up version of the changes made by the current amendment.  
The attachment is captioned "Version with markings to show changes made."


If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-0310. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

Claims 1 and 7 have been amended as follows:

1. (Twice Amended) A piezoelectric element driving circuit for driving a plurality of piezoelectric elements disposed in a plurality of ink jet head units **which are able to control velocity and size of ink droplets being proportional to an acceleration and intensity of deformation of the piezoelectric element**, comprising:

a plurality of power amplifiers for driving the plurality of ink jet head units;

a plurality of flexible flat cables disposed between said plurality of power amplifiers and the plurality of ink jet head units for connecting the plurality of ink jet head units and said plurality of power amplifiers; and

a drive waveform signal generating circuit for supplying a drive waveform signal to said plurality of power amplifiers and the plurality of ink jet head units,

wherein each of the plurality of ink jet head units has:

a switch device for supplying a piezoelectric element current to the plurality of piezoelectric elements,

wherein said plurality of power amplifiers are disposed corresponding to the plurality of ink jet head units, said plurality of power amplifiers supplying a drive waveform signal that is input from said drive waveform signal generating circuit to said plurality of power amplifiers through said plurality of flexible flat cables so as to drive the plurality of ink jet head units.

7. (Three Times Amended) A piezoelectric element driving method for driving a plurality of piezoelectric elements disposed in a plurality of ink jet head units **which are able to**

**control velocity and size of ink droplets being proportional to an acceleration and intensity**

**of deformation of the piezoelectric element**, each of ~~[which]~~ **the plurality of ink jet head**

**units** has a plurality of power amplifiers for driving the plurality of ink jet head units, a plurality of flexible flat cables for connecting the plurality of ink jet head units and said plurality of power amplifiers, and a drive waveform signal generating circuit for supplying a drive waveform signal to the plurality of ink jet head units, the method comprising the steps of:

driving the plurality of power amplifiers so as to amplify the drive waveform signal; and  
causing the plurality of ink jet head units to spray large ink droplets, middle ink droplets, or small ink droplets corresponding to the drive waveform signal that is output from the drive waveform signal generating circuit,

wherein when the small ink droplets are sprayed, the time constant of the plurality of power amplifiers that are driving allows the number of piezoelectric elements that are simultaneously driven to become maximum.